2012

Leaving the Lecture Hall: Conducting HF/E Outside the Classroom

C. B. Fausset
K. R. Bujak
K. A. Kline
Jenay Beer
University of South Carolina - Columbia, jbeer@cse.sc.edu
C.-A. Smarr

See next page for additional authors

Follow this and additional works at: http://scholarcommons.sc.edu/csce_facpub

Part of the Ergonomics Commons

Publication Info
© Ergonomics in Design 2012, Human Factors and Ergonomics Society
http://dx.doi.org/10.1177/1064804612445297

This Article is brought to you for free and open access by the Computer Science and Engineering, Department of at Scholar Commons. It has been accepted for inclusion in Faculty Publications by an authorized administrator of Scholar Commons. For more information, please contact SCHOLARC@mailbox.sc.edu.
Leaving the Lecture Hall: Conducting HF/E Outside the Classroom


The Georgia Tech Student Chapter of the Human Factors and Ergonomics Society is a collection of students from various graduate and undergraduate programs, including engineering psychology, industrial design, and human-computer interaction. The chapter provides its members with networking, service, and career development opportunities. Each year, it undertakes at least one consulting project to develop and practice members’ skills outside the classroom. This article details our experiences from a recent project.

The chapter initiated and managed a multisemester project to explore how lessons from the classroom translate into practice. The aim was to experience an entire product design cycle: initial evaluation, recommendation of changes, implementation of recommendations, and design verification. Members evaluated and redesigned the Georgia Tech School of Psychology Web site (http://www.psychology.gatech.edu), which gave them the opportunity to broaden and refine their HF/E skills on a highly visible project that would have widespread impact. Much more was riding on our ability to deliver a high-quality design than an end-of-the-semester class presentation; the finished product would be the Internet presence of the School of Psychology.

This article focuses on the lessons learned while conducting a student-led HF/E project outside the classroom. (For more details about how the evaluation and redesign were conducted, see http://www.psychology.gatech.edu/hfes/activities.htm.) These lessons are intended to be informative and helpful to both students and educators who conduct and facilitate applied HF/E projects.

Ten lessons learned and corresponding recommendations are provided to support implementation of HF/E projects outside of the classroom. Table 1 summarizes the lessons and recommendations.

LESSON 1: GET BUY-IN

Previous attempts to redesign the Web site had failed – not because of skill but because all necessary parties were not on board with the effort. Chapter members spent time identifying the Web site stakeholders whose approval of the project was critical to its success. We communicated our intentions openly and solicited feedback frequently.

Recommendation: Team members should identify and establish relationships with stakeholders to facilitate open and frequent communication via e-mail, meetings, and hallway chats. Demonstrate dedication to the project and an eagerness to satisfy stakeholder needs.

LESSON 2: DEVELOP A PROJECT TIMELINE

Classroom education rarely provides opportunities for students to gain experience in managing a self-directed project that spans a long period. Classroom projects do, however, provide ample opportunities to gain experience working within a fixed deadline. The present project presented both challenges: managing a self-directed project with a fixed deployment deadline. The chapter and technical collaborator made time estimates to complete each step and allotted buffer time. Despite these planning efforts, some last-minute decisions had to be made to meet the deadline.
Recommendation: Create a realistic rather than an optimistic timeline with milestones and a final deadline to ensure that team members meet their obligations. Team members should be forthright about potential time conflicts and make careful estimates of their availability. Include extra time for unforeseen problems.

**LESSON 3: SELECT TOOLS**

The chapter wanted to objectively identify and quantify the existing problems with the design using HF/E principles and techniques learned in the classroom. The goal was to assemble a battery of tools and methods to uncover issues with the design and identify potential solutions. In contrast to class projects in which the tools and methods are prescribed and the instructor is the primary point of guidance, this project was ill-defined, with no required tools or methods and limited guidance. We were fortunate to have team members with diverse skill sets, which enabled us to consider a variety of approaches.

**Recommendation:** Students will likely be faced with a steep learning curve when determining which tools and methods to select. Define project goals, research various tools and methods, and brainstorm approaches to maximize effectiveness. Review textbooks, search journal databases, and consult with senior graduate students who have had experience in professional settings.

**LESSON 4: UNDERSTAND THE TOOLS**

We used free online software tools to evaluate the design. One important issue associated with this practice, however, is that it is difficult to fully understand the capabilities and limitations of each tool a priori.

**Recommendation:** Pilot-test when using new tools; learn how to analyze the data. Fabricate data sets to understand the complexities of resultant output. Contact other users and/or the developers if questions arise; they might have insight about the tool and how it can best be used for the project at hand.

---

**Table 1. Ten Lessons Learned Implementing an HF/E Project Outside the Classroom**

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Get buy-in</td>
<td>Formulate a detailed project plan to which all stakeholders agree. Establish relationships with stakeholders to facilitate open and frequent communication.</td>
</tr>
<tr>
<td>Develop a project timeline</td>
<td>Create a realistic timeline with extra time included.</td>
</tr>
<tr>
<td>Select tools</td>
<td>Review the literature to understand the tools. Define project goals and brainstorm.</td>
</tr>
<tr>
<td>Understand the tools</td>
<td>Pilot-test new tools; learn how to analyze the data. Use fabricated data sets. Consider contacting the developers to provide insights about tools.</td>
</tr>
<tr>
<td>Know the user</td>
<td>Understanding users is helpful throughout the project. Do not underestimate the importance of user data.</td>
</tr>
<tr>
<td>Develop working relationships</td>
<td>Involve technical collaborators early in the project. Their expertise can be helpful in exploring potential design solutions.</td>
</tr>
<tr>
<td>Manage data</td>
<td>Identify big-picture issues and aggregate data that address the same issues. This approach reveals high-priority design changes.</td>
</tr>
<tr>
<td>Rely on expertise</td>
<td>Use your expertise to guide decisions when data are not available. Recognize and build on unique strengths of various parties to make educated guesses.</td>
</tr>
<tr>
<td>Prioritize recommendations</td>
<td>Develop a centralized and prioritized list of issues to be addressed. Deal with as many issues as possible before project launch.</td>
</tr>
<tr>
<td>Expect the unexpected</td>
<td>Be prepared to iteratively address issues, especially when design changes do not improve performance as expected. Maintain a global view of the system; consider the potential impact of multiple changes.</td>
</tr>
</tbody>
</table>
**LESSON 5: KNOW THE USER**
The HF/E dictum “know thy user” required the chapter to investigate just that: Who was using the School of Psychology Web site and why? A user analysis was conducted to define the users and their needs. Members quickly realized the diversity of the users and the wisdom that “designers do not represent all users.”

**Recommendation:** Refer back to the user analyses throughout all stages of the project, continually gleaning more information and reminding yourself of the users’ needs, capabilities, and limitations. Doing so should discourage the tendency to think about the design from only the designer’s perspective and should encourage broader thinking.

**LESSON 6: DEVELOP WORKING RELATIONSHIPS**
Chapter members were fortunate because the technical collaborator tasked with implementing the design recommendations was the information technology administrator for the School of Psychology. The chapter already had a professional relationship with him, which developed into a closer working relationship. He was aware of the project goals and timeline, and his efforts and buy-in were essential for meeting them.

**Recommendation:** Involve technical collaborators early in the project. Their expertise can be helpful in exploring potential design solutions. It is also helpful to learn some of the technical jargon and language to facilitate communication.

**LESSON 7: MANAGE DATA**
The chapter faced the challenge of managing the immense amount of sometimes contradictory data that were collected from the various tools employed. This challenge forced the team to carefully evaluate the tools and their underlying assumptions before making decisions about which changes to implement.

**Recommendation:** Identify big-picture issues and aggregate data that address the same issues. This reduces data overload and helps to reveal high-priority design changes. Design issues that involve contradicting data should be additionally researched via literature review or further testing.

**LESSON 8: RELY ON EXPERTISE**
Most of the data supported many heuristic HF/E decisions about the project redesign. The technical collaborator’s training and experience enabled him to independently make judgments about the best way to implement the design changes. There were instances, however, when neither party had clear expertise on a given issue. In these ambiguous cases, chapter members drew on acquired HF/E knowledge to provide answers and to determine the best course of action.

Ultimately, this experience helped to develop confidence and a sense of expertise.

**Recommendation:** Use expertise to guide decisions when data are not available. Recognize and build on the unique strengths of various parties to make decisions.

**LESSON 9: PRIORITIZE RECOMMENDATIONS**
The usability of the design was significantly improved, as evidenced by the evaluation data. However, not all problems were addressed during the first redesign phase because some problems slipped through the cracks along the way.

**Recommendation:** Prioritize design recommendations to ensure that the most important changes are implemented first. Consider using a centralized system for managing such information (e.g., a wiki). This system enables team members to understand what issues are being addressed and to provide a forum for discussion should disagreements arise.

**LESSON 10: EXPECT THE UNEXPECTED**
Changing many aspects of a design at once might have unintended consequences. We included one feature in the design that users expressed interest in having. However, after evaluation of the new design, we found that users did not use the new feature. This finding suggested that the new design was effective in supporting users’ product interaction without need of the feature. Time spent designing the feature could have been better devoted to other design changes.

**Recommendation:** Maintain a global view of the system, considering how various features might interact. Try not to get overwhelmed with the individual changes to the design.

**CONCLUSION**
This applied project provided valuable lessons unique to real-world experiences, including the importance of project planning and coordination among team members, learning how to use new tools in an applied setting, making decisions with and without data, and the iterative nature of design. We experienced firsthand that the success of a project depends on managing multiple constraints. The highly visible nature of this project – rather than the drive afforded by earning a course grade – strongly entrenched these lessons, thus greatly enriching our professional development.

From an educational perspective, employing an applied learning experience such as ours will assist future HF/E professionals to work through – rather than avoid – these challenges. We share these lessons as a suggestion to be considered as part of the learning process to supplement classroom education. We strongly recommend this type of student-led, applied project for those interested in experiencing HF/E outside the classroom.
Cara Bailey Fausset is a doctoral candidate in the engineering psychology program at the Georgia Institute of Technology in the Human Factors and Aging Lab. Her primary research interests are in cognitive aging, health numeracy, and aging in place.

Keith R. Bujak is a doctoral candidate in the engineering psychology program at the Georgia Institute of Technology in the Problem Solving and Educational Technology Lab. His primary research interests are in augmented reality learning, how learners study, physics education, and health behavior interventions.

Keith A. Kline is a doctoral candidate in the engineering psychology program at the Georgia Institute of Technology in the Problem Solving and Educational Technology Lab. His primary research interests are in educational technology and individual differences.

Jenay M. Beer is a doctoral candidate in the engineering psychology program at the Georgia Institute of Technology in the Human Factors and Aging Lab. Her primary research interests are in emotion recognition of virtual agent and robotic facial expressions.

Cory-Ann Smarr is a doctoral candidate in the engineering psychology program at the Georgia Institute of Technology in the Human Factors and Aging Lab. Her primary research interests are in emotion recognition of virtual agent and robots and the factors that influence the acceptance of robotic assistance in the home.

Anne E. Adams received her PhD in the engineering psychology program at the Georgia Institute of Technology in the Human Factors and Aging Lab. Her primary research is in skill acquisition, task analysis, and aging.

Sara E. McBride is a doctoral candidate in the engineering psychology program at the Georgia Institute of Technology in the Human Factors and Aging Lab. Her primary research interests are in automation, workload, dual-task, attention, and age-related effects.

John S. Burnett is a master’s candidate in the engineering psychology program at the Georgia Institute of Technology in the Human Factors and Aging Lab. His primary research interests are in older adults’ acceptance of technology and guiding development of computer systems for older adults.

The chapter thanks Gregory M. Corso, interim school chair and Web site administrator, for working with us to make this project a reality; Unmesh Deolekar, information technology administrator, for implementing much of the HTML code; Rustin D. Meyer, assistant professor of psychology, for his constructive review of the manuscript; and Wendy A. Rogers, chapter adviser, for her continuing encouragement of this and earlier out-of-classroom projects.